

REMARKS

This amendment is responsive to the Office Action of July 9, 2003. Reconsideration of claims 1-15, and 22-23 is respectfully requested.

The Office Action

Claims 1-15, and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shimizu (U.S. Patent 5,998,925) in view of Miller (U.S. Patent 6,044,189).

Claims 16-21 have been canceled.

Claims 1, 7, and 9-10 have been amended.

Claim 23 has been added.

Non-Art Amendments

The specification has been amended to correct minor mistakes. The amendments to the specification do not represent any new matter.

The Art Rejections

Claims 1-6, and 8 Distinguish Over the References of Record

Claim 1 has been amended to call for a frame including a roughened surface contacting the epoxy, the roughened surface includes at least one of ridges, grooves, and dimples to increase an area of the surface contacting the epoxy to facilitate a redirection of an unabsorbed emission backward onto the phosphor. The LED of Shimizu is mounted to a bottom portion of a recess that is filled with epoxy, which contains phosphor, surrounding the LED. The recess has a smooth surface, which reflects the emission initially unabsorbed by phosphor, back into the nitride compound. Only part of the nitride compound emission is converted into the visible light. Shimizu does not disclose or suggest mounting the LED to the frame using a phosphor containing epoxy.

Moreover, the concepts of the present application are directed to the creating of the total possible light output. The nitride emission, which is not initially absorbed by phosphor, reaches the distinctive roughened surface of the frame. The roughened surface of the frame redirects the unabsorbed emission of the nitride compound back into the phosphor, increasing the light output. Miller discloses a roughened surface which aids in adhesion of the epoxy. Miller is not concerned with the redirection of the light rays. Neither Shimizu nor Miller teaches or suggests utilizing a specifically designed roughened surface to redirect the light,

which is not initially absorbed by phosphor, back into the phosphor. It is therefore respectfully submitted that claim 1 and claims 2-6 and 8 dependent on claim 1 distinguish patentably and unobviously over Shimitsu and Miller.

Claim 7 Distinguishes Over the References of Record

Claim 7 has been amended to call for a nitride compound providing at least ultraviolet emission. Neither Shimizu nor Miller discloses or suggests the use of the nitride compound emitting ultraviolet light. It is therefore respectfully submitted that claim 7 distinguishes patentably and unobviously over Shimizu and Miller, taken singularly or in combination.

Claim 9 Distinguishes Over the References of Record

Claim 9 has been amended to call for a substrate including a first surface, the nitride compound being mounted to the first surface, and a second surface, opposing the first surface, the epoxy being mounted to the second surface to substantially cover the second surface. The LED of Shimizu is mounted to a bottom portion of a recess that is filled with epoxy containing phosphor such that epoxy and phosphor surround the LED's three surfaces. As claimed in claim 9, the present application directs mounting of the nitride compound and epoxy containing phosphor on the opposite sides of the substrate. The nitride compound and epoxy, which contains phosphor, do not come into direct contact with each other. Since teaching or suggestion of such construction is lacking in either Shimizu or Miller taken singularly or in combination, it is respectfully submitted that claim 9 distinguishes patentably and unobviously over Shimizu and Miller.

Claims 10-15 and 22 Distinguish Over the References of Record

Claim 10 calls for the contoured surface portion to include structures arranged to cooperate with the epoxy to redirect unconverted first wavelengths backward into the phosphor. The LED of Shimizu is mounted to a bottom portion of a recess that is filled with epoxy, which contains phosphor, surrounding the LED. The recess has a smooth surface, which reflects the emission, initially unabsorbed by phosphor, back into the nitride compound. Only part of the LED emission is converted into the visible light. The LED and the phosphor are not mounted on the opposite sides of the substrate. Claim 10 calls for structures arranged on a portion of the frame. The structures are in contact with the epoxy containing phosphor which is mounted only on one end of the semiconductor. The structures cooperate with the epoxy to redirect unabsorbed light of the first wavelengths back into the phosphor. Miller

discloses a roughened surface which aids in adhesion of the epoxy. Miller is not concerned with the redirection of the light rays. Neither Shimizu nor Miller teaches or suggests designing structures such that when the structures are in contact with the epoxy, the unabsorbed light rays are redirected back into the phosphor. It is therefore respectfully submitted that claim 10 and claims 11-15 and 22 dependent on claim 10 distinguish patentably and unobviously over Shimizu and Miller.

Claim 23 has been added to claim a certain aspect of the Applicant's concept. Claim 23 calls for among other limitations: a light emitting diode secured to the roughened surface of the frame via a phosphor containing epoxy. Neither Shimizu, nor Miller taken singularly or in combination discloses or suggests mounting the LED to the lead frame using a phosphor containing epoxy. It is therefore respectfully submitted that claim 23 distinguishes patentably and unobviously over Shimizu and Miller.

CONCLUSION

On the basis of the above amendments and remarks, reconsideration of this application and its early allowance are requested.

Respectfully submitted,

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